Timeline of Events Addressing Citizen Concerns

- **April 21, 2008** — The Bureau of Air Quality (the Bureau) received a request from Starbucks Manufacturing Corporation (Starbucks) to incorporate changes to the Construction Permit issued July 27, 2007.

- **October 9, 2008** — A Public Notice was published in *The Calhoun Times* in Saint Matthews, South Carolina.

- **October 10, 2008** — A citizen that resides near Starbucks contacted the Bureau with concerns about emissions and potential odors from the facility.

- **November 6, 2008** — A meeting was held to discuss the concerns of the resident. This meeting included several representatives from the Bureau, a representative from Starbucks, and the concerned citizen. The meeting concluded with the Bureau offering to develop some data to address the citizen's concerns. The citizen's concerns included potential odor issues and particulate matter emission impacts. The Bureau agreed to review and summarize odor and health threshold information on the pollutants acetaldehyde and formaldehyde and to provide a depiction of particulate matter, acetaldehyde and formaldehyde concentrations at the facility property line and beyond.

- **November 11, 2008** — The Bureau reviewed available odor and health threshold information and summarized this information. The reviewed showed that the maximum predicted concentration of both acetaldehyde and formaldehyde from Starbucks was below the odor thresholds and the SC Standard 8 maximum allowable concentration. This summary is in Appendix 1.

- **November 26, 2008** — To address the concerns of Acetaldehyde, Formaldehyde, and particulate matter impacts, air dispersion modeling submitted by Starbucks and reviewed by the Bureau was used to develop emission concentration isopleths that visually depict emissions concentrations at the facility property and beyond. These depictions are included in Appendix 2.

- **December 17, 2008** — The Bureau sent, via electronic mail, the odor and air dispersion modeling information to the concerned citizen.

- **December 18, 2008** — The concerned citizen contacted the Bureau and discussed the email that was sent on December 17, 2008.

- **March 9, 2009** — Condition 26 of the revised construction permit was added to verify emission estimates and demonstrate compliance with the regulatory standards. . This condition requires the facility to conduct an initial source test for NO_x, CO, VOC and formaldehyde emissions within 180 days after startup.

APPENDIX 1

Odor Threshold Study
Starbucks Manufacturing Corporation

Acetaldehyde

Thresholds – The odor threshold is **50 ppb**. The Occupational Safety and Health (OSHA) is the main federal agency responsible for the enforcement of safety and health legislation. The OSHA permissible exposure limit in workplace air is **199,000 ppb**. The American Conference of Governmental Industrial Hygienists (ACGIH) is a professional association of industrial hygienists and practitioners of related professions. One of its goals is to advance worker protection by providing timely, objective, scientific information to occupational and environmental health professionals. The ACGIH recommends a workplace air limit of **24,900 ppb**. The referenced concentration (RfC) is an estimate of an inhalation exposure, for a given duration (70 yrs), to the human population (including sensitive groups such as children, elderly, asthmatics) that is likely to be without an appreciable risk of adverse health effects over a lifetime. The RfC is **4.9ppb**. The average no-observed-adverse-effect-level (NOAEL) of 151,500 ppb was adjusted from an occupational exposure scenario to continuous exposure conditions resulting in a **27,100 ppb** threshold. Since acetaldehyde is considered a probable cancer risk, the quantitative estimate of carcinogenic risk is as follows: 1 in million = **0.28 ppb**, 1 in 100,000 = **2.8 ppb**, and 1 in 10,000 = **28 ppb**. Our Standard 8 Maximum Allowable Concentration (MAC), which covers both acute and chronic effects (according to the 2000 USC report on Air Toxics Report) is **998 ppb**. Proposed air dispersion modeling predicts a Starbucks Manufacturing Corporation controlled fenceline concentration of **0.04 ppb**

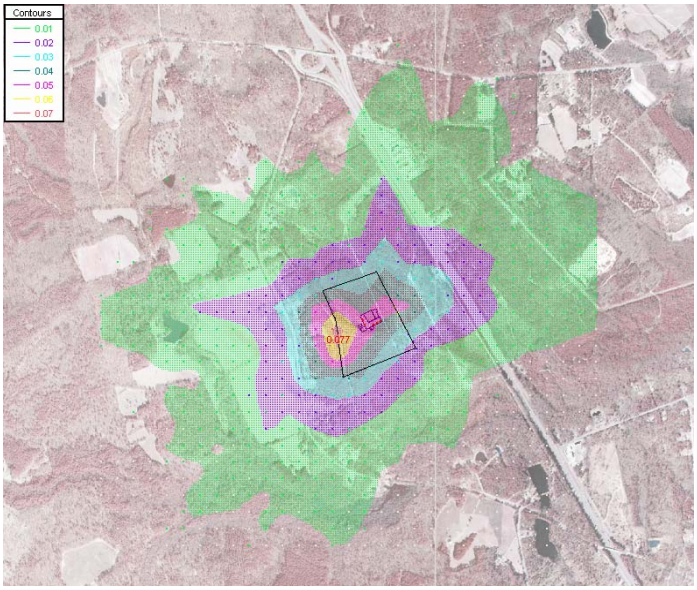
Formaldehyde

Thresholds – The odor threshold is **830 ppb**. The Occupational Safety and Health (OSHA) is the main federal agency responsible for the enforcement of safety and health legislation. The OSHA permissible exposure limit in workplace air is **733 ppb**. The American Conference of Governmental Industrial Hygienists (ACGIH) is a professional association of industrial hygienists and practitioners of related professions. One of its goals is to advance worker protection by providing timely, objective, scientific information to occupational and environmental health professionals. The ACGIH recommends a workplace air limit of **326 ppb**. The referenced concentration (RfC) is an estimate of an inhalation exposure, for a given duration, to the human population (including sensitive groups such as children, elderly, asthmatics) that is likely to be without an appreciable risk of adverse health effects over a lifetime. A RfC has not been established by EPA. A no-observed-adverse-effect-level (NOAEL) has not been established by EPA. Since formaldehyde is considered a probable cancer risk, the quantitative estimate of carcinogenic risk is as follows: 1 in million = **0.07 ppb**, 1 in 100,000 = **0.65 ppb**, and 1 in 10,000 = **6.5 ppb**. Our Standard 8 Maximum Allowable Concentration (MAC), which covers both acute and chronic effects (according to the 2000 USC report on Air Toxics Report) is **12.2 ppb**. Proposed air dispersion modeling predicts a Starbucks Manufacturing Corporation controlled fenceline concentration of **1.2 ppb**.

APPENDIX 2

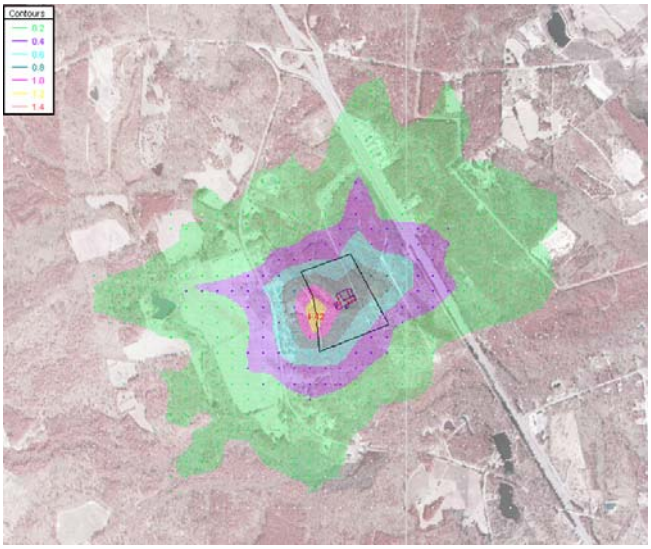
Emission Concentrations Isopleths
Starbucks Manufacturing Corporation

Acetaldehyde



Maximum concentration of 0.077 ug/m3 predicted on the western boundary of the facility. This concentration is well below the standard of 1800 ug/m3 and the odor threshold of 90 ug/m3. The graphic depicts the gradual decline in the acetaldehyde concentrations away from the facility down to less than 0.01 ug/m3 at a distance of about 1400 meters from the facility. Receptors (darker colored and gray spots) are spaced 100 meters apart. Modeling for Acetaldehyde was required by Standard 8 – Toxic Air Pollutants.

Formaldehyde



Maximum concentration of 1.42 ug/m3 predicted on the western boundary of the facility. This concentration is well below the standard of 15.00 ug/m3 and the odor threshold of 1018 ug/m3. The graphic depicts the gradual decline in the formaldehyde concentrations away from the facility down to less than 0.2 ug/m3 at a distance of about 1400 meters from the facility. Receptors (darker colored and gray spots) are spaced 100 meters apart. Modeling for Formaldehyde was required by Standard 8 – Toxic Air Pollutants.

APPENDIX 2

Emission Concentrations Isopleths
Starbucks Manufacturing Corporation

TSP/PM_{10} (Particulate)

Maximum concentration of 7.00 ug/m3 predicted on the eastern boundary of the facility. The total predicted concentrations of 32 ug/m3 and 28 ug/m3 after the background concentrations are added are well below the TSP and PM10 standards of 75 ug/m3 and 50 ug/m3, respectively. The graphic depicts the gradual decline in the PM concentrations away from the facility to less than 1.0 ug/m3 (or 26 ug/m3 and 22 ug/m3 total) at a distance of about 800 meters from the facility. Receptors (darker colored and gray spots) are spaced 100 meters apart. Modeling for TSP/PM_{10} (particulate) was required by Standard 2 – Ambient Air Quality Standards.

PM_{10} (Particulate)

24-hr 6th high concentration of 28.45 ug/m3 predicted on the eastern boundary of the facility. The total predicted concentration of 66 ug/m3 after the background concentration is added to this is well below the PM10 standard of 150 ug/m3. The graphic depicts the gradual decline in the PM concentrations away from the facility to less than 3.0 ug/m3 (or 41 ug/m3 total, including background) at a distance of about 1400 meters from the facility. Receptors (darker colored and gray spots) are spaced 100 meters apart. Modeling for TSP/PM_{10} (particulate) was required by Standard 7(c) – Ambient Air Increments.